



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/NL97/00590 <b>(22) International Filing Date:</b> 28 October 1997 (28.10.97) <b>(30) Priority Data:</b> 1004374 29 October 1996 (29.10.96) NL <b>(71) Applicant (for all designated States except US):</b> PARK TOWERS INTERNATIONAL B.V. [NL/NL]; Zuiderkade 31, NL-1948 NG Beverwijk (NL). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> VAN DER HEIJDEN, Edgar, Ivo, Maria [NL/NL]; Joh. Huizingastraat 14, NL-1827 NA Alkmaar (NL). <b>(74) Agent:</b> BAKKUM, R., J.; Van Exter Polak & Charlouis B.V., P.O. Box 3241, NL-2280 GE Rijswijk (NL).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Dutch).</i>
<b>(54) Title:</b> DISPENSING ASSEMBLY FOR A SPRAYER, SPRAYER PROVIDED WITH SUCH A DISPENSING ASSEMBLY AND A SEALING ELEMENT THEREFOR		
<b>(57) Abstract</b>  Dispensing assembly for a sprayer, intended for dispensing a liquid, at least comprising an outflow channel which opens out into a dispensing aperture, a dispensing pump with a piston (4) which is movable in a piston chamber (1), and a control part interacting with the pump, the wall of the piston chamber comprising an aeration aperture (3) interacting with a non-return valve (15) for aerating a container from which the liquid is being extracted, wherein the non-return valve (15) is situated in the aeration-aperture (3).		

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Short title:     Dispensing assembly for a sprayer,  
                  sprayer provided with such a dispensing  
                  assembly and a sealing element therefor

          The present invention relates in the first  
place to a dispensing assembly for a sprayer, intended  
for dispensing a liquid, at least comprising an outflow  
channel which opens out into a dispensing aperture, a  
5   dispensing pump with a piston which is movable in a  
piston chamber, and a control part interacting with the  
pump, the wall of the piston chamber comprising an aer-  
ation aperture for aerating a container from which the  
liquid is being extracted, while a non-return valve  
10   interacts with the aeration aperture.

          Such a dispensing assembly is known from the  
French Patent Application FR-A-2,075,992.

          In the case of the known dispensing assembly  
the non-return valve is formed by a valve element made  
15   of elastomeric material in the shape of a truncated  
cone, which interacts with the cylindrical piston  
chamber below the aeration aperture. At the base end  
thereof, the valve element is provided with an annular  
flange which is clamped between the top end of the neck  
20   of the liquid reservoir and a bearing flange of the  
cylindrical piston chamber. The circular aperture at  
the truncated end of the valve element rests under pre-  
stress against the outside of the cylindrical piston  
chamber of the dispensing pump. In order to ensure a  
25   good seal over the relatively large peripheral surface  
of the cylindrical piston chamber, the pre-stress of  
the valve element must be relatively high, but this  
means that the valve element will be able to open only  
when there are relatively high pressure differences  
30   between the environment and the interior of the  
sprayer. Furthermore, the external surface of the  
cylindrical piston chamber can easily become damaged  
during transport, with the result that the sealing  
action of the valve element is adversely affected.

The object of the invention is to improve the above dispensing assembly, and to that end the invention is characterized in that the non-return valve is situated in the aeration aperture.

5           This embodiment has the advantage that the non-return valve can be made more compact in design, with the result that the non-return valve can be manufactured more accurately and the pre-stress of the non-return valve can be set at a lower value. The  
10 dispensing assembly will therefore react to small pressure differences. Furthermore, the contact face of the non-return valve with the edge of the aeration aperture is small, and the contact face is recessed in the wall of the piston chamber, with the result that  
15 said contact face will not be subject to damage. This means that a good sealing action of the non-return valve will always be ensured.

          The aeration aperture with the non-return valve can be disposed at any position in the piston chamber  
20 wall, but in a specific embodiment the aeration aperture is situated in the wall of the piston chamber opposite the piston. Contrasting with the known dispensing assembly according to the prior art, the use of a non-return valve in the aeration aperture will  
25 mean that the aeration aperture can be made in the wall of the piston chamber opposite the piston, in other words, the bottom of the piston chamber, which brings considerable advantages as regards manufacture. The aeration aperture is consequently situated upstream of  
30 the piston chamber, viewed in the release direction of the mould, as against the lateral aeration aperture in the dispensing assembly according to the prior art, in which one or more moving mandrels must always be present in the mould in order to produce the aeration  
35 apertures.

          In the prior art many forms of non-return valves are known, all of them suitable in one way or another for use as a non-return valve in the case of the invention. However, in a special embodiment, the

non-return valve comprises a sealing element fitted in the aeration aperture, which sealing element comprises a sealing disc with a central bar which extends substantially perpendicular to the sealing disc and is provided at the end with a number of projections, and which at least locally has a smaller diameter than the aeration aperture, the projections on the inside of the piston wall and the sealing disc on the outside of the piston wall clamping the piston wall under pre-stress.

This design is a fairly simple design, in which the sealing element can be snapped into the aeration aperture, and the usual aeration aperture needs little or no adjustment. All the above will be explained in greater detail in the description of the figures below.

Dispensing assemblies often have one or more non-return valves between the dispensing pump(s) present therein and the outflow channel or the dispensing aperture, in order to permit liquid or air to be sucked up into the piston chamber concerned and dispensed therefrom through the outflow channel. The pre-stress of the non-return valve according to the invention is preferably selected in such a way that the latter cannot be opened during dispensing of liquid. The above can be achieved in a simple manner by making the pre-stress of the non-return valve according to the invention greater than the pre-stress of any valves which may be present between the dispensing pumps and the dispensing aperture.

The invention also provides a sprayer, comprising a container for liquid to be dispensed and a dispensing assembly, which is characterized in that the dispensing assembly is a dispensing assembly according to the invention.

Finally, a sealing element for a dispensing assembly according to the invention is provided.

The invention will be explained in greater detail below with reference to the appended drawing, in which:

Fig. 1 shows a part of a known piston chamber,

with an aeration aperture according to the prior art;

Fig. 2 shows a piston chamber according to Fig. 1, with an aeration aperture and non-return valve according to the invention;

5 Fig. 3 shows an embodiment of a dispensing assembly according to the invention, with non-return valve in the bottom of the piston chamber;

Fig. 4 shows the operation of the non-return valve according to Figs. 2 and 3.

10 Fig. 1 shows a part of a known dispensing assembly with an air piston chamber 1, and a piston chamber wall 2 containing an aeration aperture 3. A piston 4 can be moved up and down in the air piston chamber 1 by a control part which is not shown. In the  
15 case of the known dispensing assemblies one or more separate pumps are present for liquid to be dispensed or for other constituents. A coaxial liquid pump, surrounded by the air piston 4 and the air piston chamber 1, is usually present. However, for the sake of  
20 clarity, these are not shown in any further detail here. Only the operation of the aeration aperture 3 will be explained. The wall 2 of the air piston chamber 1 comprises a flange 5 which, with the interposition of suitable sealing means, can usually be fixed on the  
25 opening of a container, often a bottle. After fixing, the interior of the container is therefore situated at the position of 6.

The piston 4 comprises an annular sealing element 8, which comprises a top sealing edge 9 and a  
30 bottom sealing edge 10. A non-return valve 11 is also present in the piston chamber, which non-return valve serves to permit air to be sucked up into the air piston chamber 1 and dispensed therefrom. Such a non-return valve 11 is often a dual-action valve, which  
35 regulates both the supply of air to and discharge thereof from the piston chamber 1.

In operation, the air piston 4 is moved downwards, so that the volume of the piston chamber 1 is reduced and air is dispensed. At the same time, liquid

or another material is dispensed from the container, usually by means of a separate pump. When the sealing edge 9 moves downwards past the aeration aperture 3, the aeration aperture is in open communication with the environment by way of the space 7 and any other apertures. When liquid or other material is removed from the container, the volume of said removed liquid or material is made up with air through the aeration aperture 3.

However, the seal between the sealing edge 9 and the wall 2 of the piston chamber 1 is often inadequate. If the sprayer is held upside down and liquid thus passes through the aeration aperture 3 and comes to rest against the piston ring 8, said liquid can pass through between the wall 2 and the sealing edge 9, because usually with use grooves or the like may be present in the outside of the sealing edge 9 or the wall 2.

It will be clear that, although an air piston chamber 1 is spoken of above, said chamber may, of course, also be a liquid piston chamber in a sprayer in which liquid alone is dispensed, and in which only one pump is therefore present.

Fig. 2 shows an embodiment of a part of a dispensing assembly according to the invention, in which a non-return valve 15 is present. In this embodiment also, the dispensing assembly comprises at least two pumps, with coaxial piston chambers, only the outermost air piston chamber 1 of which is shown. This figure shows in greater detail the dual-action valve 11, which can be designed, for example, as described in EP-A-0 613 728 (Daiwa).

The piston 4 in this embodiment comprises an annular part 8 with a sealing edge 10, and in this case the sealing edge 9 is omitted, in order to prevent the possibility that it could become caught behind the non-return valve 15. It will be clear that in the event of the non-return valve 15 being recessed in the wall 2, said sealing edge can be present, but this is not

necessary.

The operation of the non-return valve 15 according to the invention is in no way dependent on the movement or state of the air piston 4, since it depends solely on the pressure in the container 6. If during dispensing of liquid or material from the container 6 the negative pressure occurring there becomes so low that it exceeds the pre-tension of the non-return valve 15, the non-return valve will open and air will be sucked up by way of 7 from the environment.

In Fig. 3 the aeration aperture 3 is present in a bottom 16 of the piston chamber 1, and to that end the piston chamber is provided locally at 17 with a deformation, in order to permit accommodation of the aeration aperture 3 with the non-return valve 15. This embodiment has the very important advantage that during manufacture of the dispensing assembly, for example by injection moulding, the aeration aperture is situated in the release direction of a mould to be used, which produces very considerable cost savings during manufacture.

It will be clear that in the case of this embodiment the pre-stress of the non-return valve 15 must be selected relative to that of the dual-action valve 11 or other pre-stress valves present in such a way that when air is dispensed from the piston chamber 1 during use of the sprayer the non-return valve is not opened.

Fig. 4 shows the operation of the non-return valve 15 according to the invention. Said non-return valve comprises a sealing element 20, consisting of a sealing disc 21 with a bar-shaped part 22 which comprises a number of lugs 23 at the end. The bar-shaped part 22 has a smaller external diameter than the internal diameter of the aeration aperture 3. One of the two can also be provided with grooves or the like, in order to produce the same effect. In the outside of the wall 2 a stepped recess 24 is present, with a shoulder 25 on which the sealing disc 21 rests. The



aeration aperture 3 is also provided with a slightly bevelled wall 26, in order to simplify the insertion of the sealing element 20. Fig. 4a shows a neutral position, in which the negative pressure at the position of 6 in the container does not exceed the pre-stress of the non-return valve 15. However, if the negative pressure becomes too great at the position of 6 in the container, the sealing disc 21 will detach itself at least locally from the shoulder 25 and, as indicated by dotted line 27, air will be able to move into the container from outside.

It will be clear that many other variants of the non-return valve 15 are possible.

Claims

1. Dispensing assembly for a sprayer, intended for dispensing a liquid, at least comprising an outflow channel which opens out into a dispensing aperture, a  
5 dispensing pump with a piston which is movable in a piston chamber, and a control part interacting with the pump, the wall of the piston chamber comprising an aeration aperture for aerating a container from which the liquid is being extracted, while a non-return valve  
10 interacts with the aeration aperture, characterized in that the non-return valve is situated in the aeration aperture.
2. Dispensing assembly according to claim 1, characterized in that the aeration aperture (3) is  
15 situated in the wall (16) of the piston chamber (1) opposite the piston (4).
3. Dispensing assembly according to claim 1 or 2, characterized in that the non-return valve (15) comprises a sealing element (20) fitted in the aeration  
20 aperture (3), which sealing element comprises a sealing disc (21) with a central bar (22) which extends substantially perpendicular to the sealing disc (21) and is provided at the end with a number of projections (23), and which at least locally has a smaller diameter  
25 than the aeration aperture (3), the projections (23) on the inside of the piston wall (2) and the sealing disc (21) on the outside of the piston wall (2) clamping the piston wall (2) under pre-stress.
4. Dispensing assembly according to one or more of  
30 the preceding claims, characterized in that the pre-stress of the non-return valve (15) is selected in such a way that the latter cannot be opened during the dispensing of liquid.
5. Sprayer, comprising a container for liquid to  
35 be dispensed and a dispensing assembly, characterized in that the dispensing assembly is a dispensing assembly according to one or more of the preceding claims.

6. Sealing element for a dispensing assembly according to one or more of claims 1 - 4.

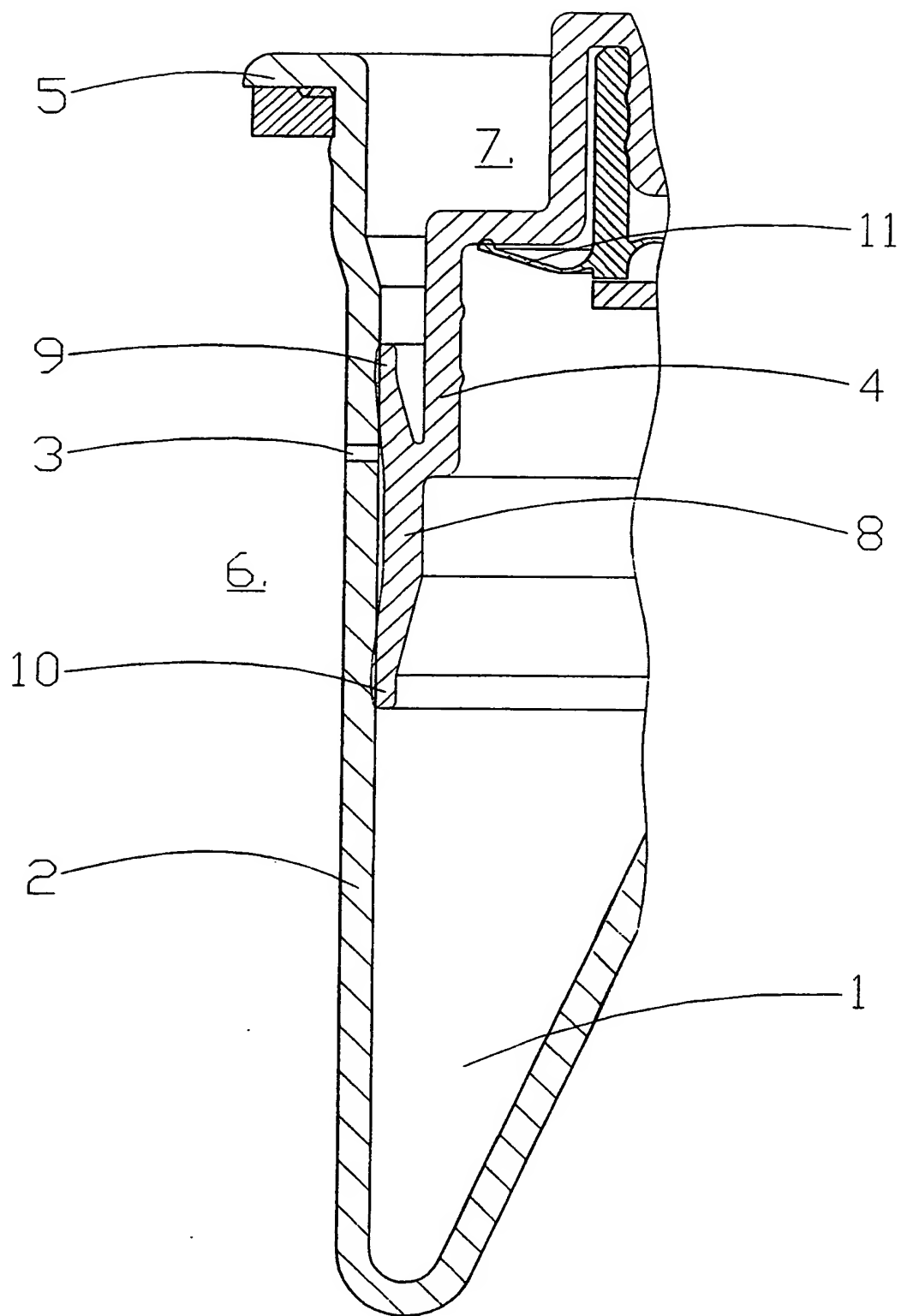


Fig.1

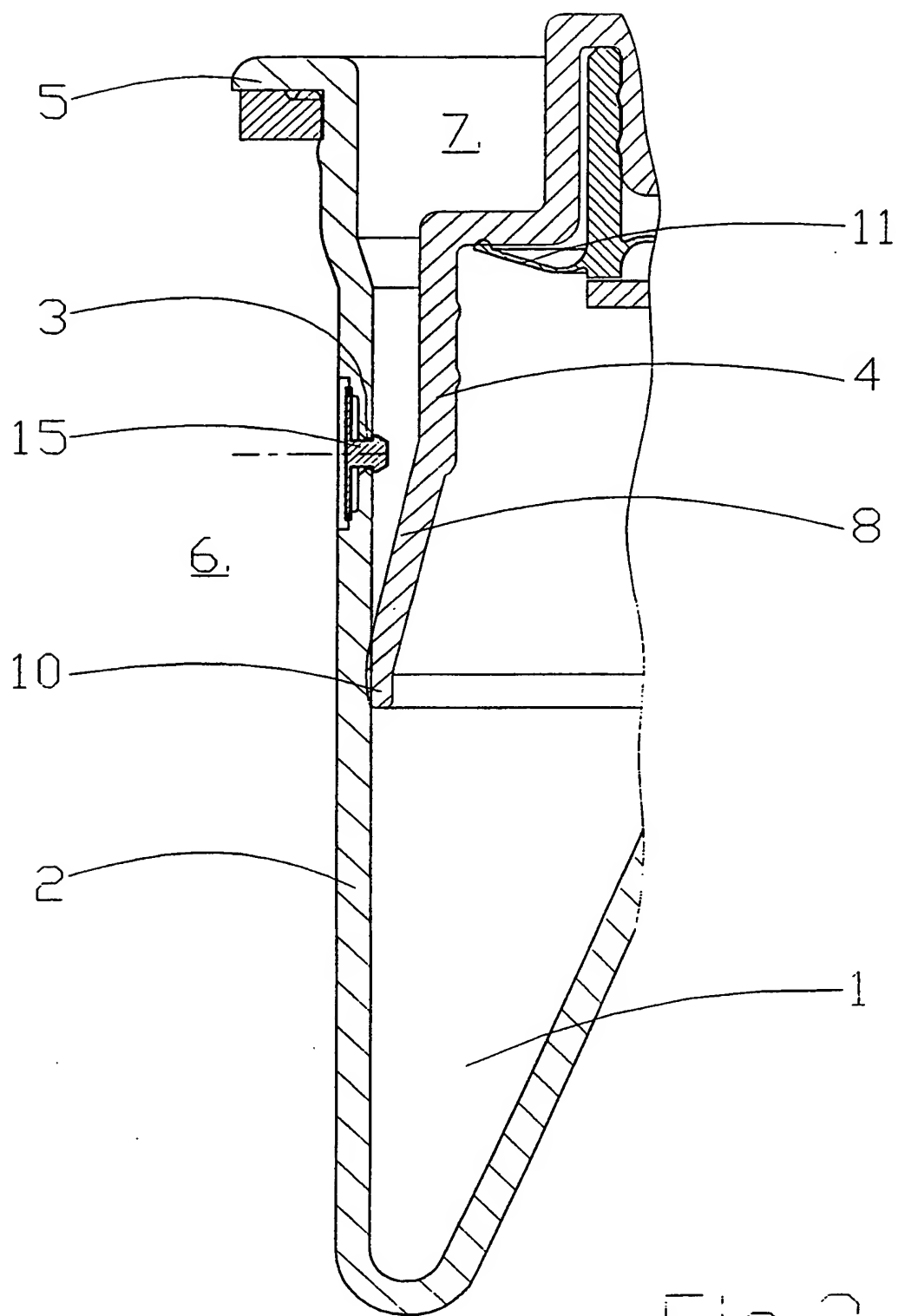


Fig. 2

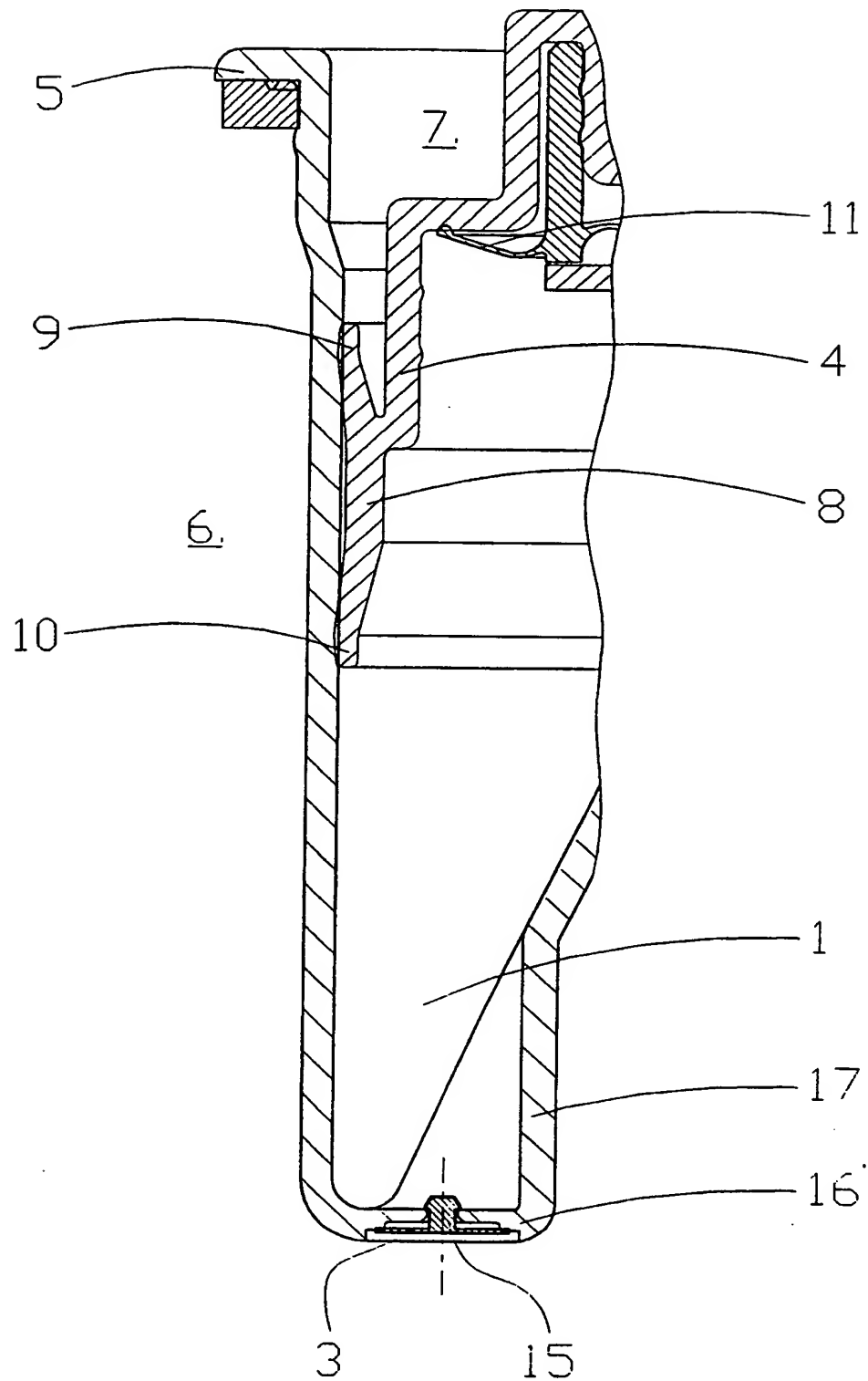


Fig. 3

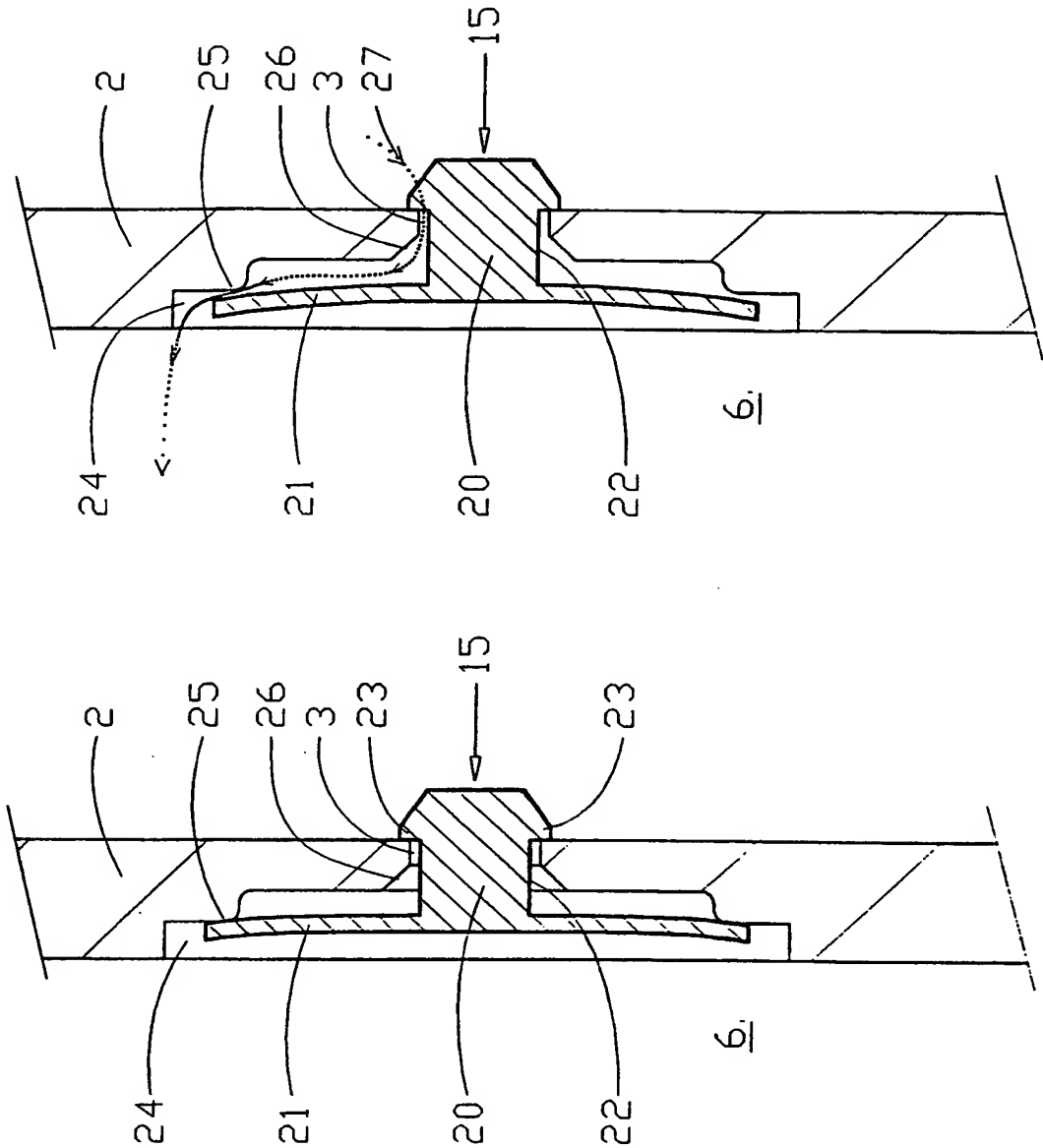


Fig. 4b

Fig. 4a

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/NL 97/00590

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 6 B05B11/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 171 462 A (PFEIFFER ERICH GMBH & CO KG) 19 February 1986 see page 8, column 17 - page 9, column 5	1,2,4-6
X	FR 2 075 992 A (DIAMOND INTERNATIONAL CORPORATION) 15 October 1971 see page 7, line 28 - page 38	1,2,4-6
A	DE 85 35 472 U (SPRAY PLAST S.P.A.) 6 February 1986 see the whole document	1,3

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

**\* Special categories of cited documents :**

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Date of the actual completion of the international search

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20/01/1998

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NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Juguet, J



# INTERNATIONAL SEARCH REPORT

Information on patent family members

Inventor's Application No

PCT/NL/00590

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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